The Canadian Entomologist.

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PROCEEDINGS OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Club assembled in the State House at Indianapolis, Ind., on Wednesday, August 20th, 1890, and began its regular sessions at 9 o'clock a. m., the President, Prof. A. J. Cook, Agricultural College, Mich., in the chair.

There were present during the meetings :—W. B. Alwood, Blacksburg, Va.; Geo. F. Atkinson, Columbia, S. C.; W. S. Blachley; P. Carter; Prof. E. W. Claypole and K. B. Claypole, Akron, Ohio; F. S. Earle, Ocean Springs, Mich.; S. G. Evans, Evansville, Ind.; James Fletcher, Ottawa, Ont.; H. Garman, Lexington, Ky.; Mrs. O. Hanney; C. W. Hargitt, Oxford, Ohio; Thos. Hunt; John Marten, Albion, Ill.; Miss Mary E. Murtfeldt and Miss Augusta Murtfeldt, St. Louis, Mo.; W. W. Norman; Prof. Herbert Osborn and L. H. Pammel, Ames, Iowa; R. S. F. Perry; C. Robertson, Carlingville, Ind.; Prof. J. W. Spencer, Athens, Ga.; James Troop and Prof. F. M. Webster, Lafayette, Ind.; Dr. Clarence M. Weed, Columbus, Ohio, and others.

The President, Prof. A. J. Cook, delivered the following address :—

ON TEACHING ENTOMOLOGY.

Ladies and Gentlemen of the Entomological Club,—I congratulate you that another year has passed, and our number has not been broken in upon by death. While our ranks have been much enlarged, no one has been called to that undiscovered country from whose bourne no traveller returns. I also congratulate you upon the great increment in our force of working entomologists. I think I may say, with no fear of contradiction, that no year in the history of America has been so remarkable in this respect as has the last. This is a cause for special felicitation, not only to entomologists, but to all our people. Ours is a tremendous country—by ours I include, of course, our Canadian brothers, for we, as scientists, know no line of separation—and to spy out the entire land needs an army of workers or observers, all trained to keen sight and

ready apprehension. But more than this the magnitude of our country is fully equalled by the magnitude of the insect hosts, and to know all of these, with their full life history, requires an incalculable amount of closest research. But our business economy demands this for all our species: for so wonderful is the balance of nature, so close the relations of all species of life, that really we may hardly divide insects into those important and those unimportant in our agricultural economy. All are important; and so from an economic, no less than a scientific standpoint, it is desirable that all such research be widely encouraged, and it is a most hopeful omen—the rapid increase of earnest and trained workers. I shall not in this address occupy time by giving the peculiarities of the season in respect to insects, nor yet call attention to interesting discoveries, like the importation of the *Vedalia cardinalis*. All these will be brought out in papers and discussions. I must, however, refer to the new association for the advancement of economic entomology, which was organized at Toronto a year ago, and which held its first meeting at Washington last November. This meeting, under the Presidency of Dr. Riley, was a valuable one; and that society promises much for the science of entomology, as well as for its economic development. It is also a matter of much interest that a new paper—"Insect News"—is started at that great centre of entomology—Philadelphia—which will also do much every way for our science. This, with the very excellent periodical "Insect Life," published by the Entomological Division of the Department of Agriculture, can but give new impetus to entomological research. In addition to these, we have an addition to Prof. Comstock's admirable work, which, when completed, will form a most valuable adjunct in the development of entomology. If we may judge from what we already have, this will be invaluable in every entomological laboratory. When the Society of Economic Entomologists was organized a year ago it was remarked by one of our first entomologists that that move sounded the death-knell of this Club. I then remarked that such ought not to be the case. That Society is to be composed only of those interested in economic entomology, and of course will only put emphasis in the direction of the practical aspects of the science; this more or less of entomologists in a wider sense, and so will include those interested in practical entomology and also in the science without relation to utility. The Club then may well continue. I believe it will live and thrive, and

will be most helpful to entomologists and to our science. While the other Association will discuss economic questions, this Club will place no limit on either its discussions or its membership, only so far as entomology shall be its aim and purpose. No one doubts but that he who has a thorough training in the science of entomology will be far better prepared for practical work, and so there can be only the most cordial relation between the Association of Economic Entomologists and this Club. Indeed, many of our most active entomologists will be members of both. I have already stated the truism that only can he do the best practical work in entomology who is thoroughly well grounded in the general science of entomology. As we now have a great call for entomologists in our experimental stations, agricultural colleges, and as State entomologists, not to speak of the fact that every farmer and fruit-grower would be more successful if he were well informed in this science, it goes without saying that there ought to be in training men for just such work. It seems to me that it needs no argument to show that our agricultural colleges are just the places where this training should be given. They were founded to teach those subjects which would be most serviceable on the farm. Entomology is one of the chief of these. Thus it follows that every student of agriculture should have a thorough course in this science, with the practical aspect of the subject kept in the foreground. In thus presenting this science to large classes — I have from thirty to forty each year who study this subject in the course—the teacher will find some in each class who are specially fitted to succeed. They enjoy the study and work most earnestly just for the love of the pursuit. They have quick observation, and are very accurate and honest in all their work. It needs no prophet to bespeak success in this field for such students. Our agricultural colleges are just the places to discover the men who have great possibilities in this direction; just the places to give the training that shall best fit men to do the most valuable work. It will be my purpose in the remainder of this address to describe the equipment for such work, and to explain the method which I believe will give the best results. Of first importance is a good library; this should contain all the standard works, periodicals and monographs, so that students who may decide to study any insect or genus, may find what has been written on the subject. Of course this cannot be had at once, but it is so essential

that no effort should be spared to build up a complete entomological library at the earliest possible moment. *True*, the scientist should study *things*, not books, but he will find a wide use of books most helpful in his study. Next to a library, such colleges should have good collections, which are often of more value than the library. A small show collection, illustrating the families and orders, and the several stages of the most injurious species of the place as well as the groups of beneficial ones should be open to the public. This will be studied and appreciated by the practical farmer, who, as he visits the college, will find it helpful, and will also interest and stimulate the under-class men, who will thus have their attention called towards insects before they commence the regular study, which will not occur till they are well along in the course. Drawing, botany, microscopy, and French and German, if thoroughly understood, will be great aids to the student who commences the study of entomology. Thus this study will come late in the course and the show collection will be whetting the appetite of the under-class men from the time they enter college until they commence the study. I would also have what I call a student collection—this is a pretty full collection from the locality of the college. This I would hang upon the wall of the lecture room, which I would have dark, except when in use, so as to preserve the colour of the specimens. I would have this in rather small cases, with glass in front and also back where it is desirable, as in case of Diurnals, to study both under and upper sides of the wings. This collection should show at least types of each group in all stages, from egg to imago, as well as nests, cocoons, etc. This is an object lesson ever before the student, is ever ready for use by the teacher to illustrate his lecture, and is at the disposal of the students in naming their own collections or in closer study of any group. It seems to me such a collection should be in every college. Lastly, I would have a laboratory collection which should be a biological collection, and the fuller the better. This is in large, tight, glass-faced drawers. I use the Harvard case. This is for the use of teachers and post-graduates who desire to study further in the science. It is too valuable for general use by the student or to be kept to satisfy general curiosity.

"THE COURSE OF STUDY."

As I have before remarked, before the student commences the study of insects he should have had a good course in free-hand drawing, should

have had instruction in the use of the microscope and in preparing microscopic specimens and slides, and if he has a ready use of German and French it will be very helpful to him in his study. It is also desirable that the student should have had a full course in botany. The students of our college have had three terms of botany, one devoted entirely to microscopic botany, before they begin the study of entomology. I consider this very valuable preparatory work. Entomology is very close precise work, and the laboratory work if carried on for a less space than three hours at a time is not satisfactory. But three hours of such close work is very wearying unless the student has had a fitting preparation. Thus I am pleased that our students have had *vertebrate dissection* with human and comparative anatomy and physiology before they commence entomology. I know this seems the reverse of the natural method; as nature proceeds from lower to higher; vertebrate dissection is lighter and less trying to eye and brain than is the study of insect anatomy; thus I am pleased to have Anatomy and Physiology of Vertebrates precede that of the Arthropoda in our course. In our College the student attends a course of sixty lectures on the anatomy and physiology of insects, systematic entomology and the economic bearing of the subject. These lectures are illustrated by use of models, the student's collection of insects, already referred to, by microscopic preparations, mostly prepared at the College, and elaborate charts and drawings also prepared specially for our use. In connection with this course there are 36 hours of laboratory. Each student works three hours one day each week for twelve weeks. In this time they are able to study the internal anatomy, and to examine carefully and accurately one insect of each order. In connection with this several insects are traced to the genus by such keys as Leconte and Horn, Cresson, Williston, etc. Besides the above, each student makes a collection of from ten to twenty-five insects of each order, all neatly put up with date and locality label; each order by itself and all labelled as far as time will permit. Many students succeed in naming a large number of their specimens. Each student is also required to mount insects in all the approved ways. Small insects mounted on triangular pieces of cardboard or rectangles of cork with silver wires, while the larvæ are put in bottles of alcohol with rubber corks and also prepared by eviscerating and drying, while distended with air, in a heated oven. The students are also encouraged to prepare biological collections, in

which they preserve the eggs, larvæ after each moult, pupa, cocoon, imago of both sexes, and of various sizes and the several variations. Some of our most enthusiastic students work out several such life histories, describing not only the separate stages, but the several parasites that work to destroy the insects. I regard this work as very valuable. It is excellent discipline for the mind and observation, gives accurate information of the most interesting kind, and arouses enthusiasm for the study as nothing else can. It is such work as this that will tell for the future of entomological research, that will make entomologists, who will honour alike the fields of pure and applied entomology. But such study ought not and will not stop here. Post-graduates will avail themselves of the opportunities which such laboratories offer. Last winter during our long vacation—ours is an agricultural college and our vacations must needs occur in winter, when farm operations are largely at a standstill—I had ten special students of entomology in my laboratory, one from South Dakota, one from Indiana, one from Ohio, one from Japan, one from Wisconsin, and the others from our own State. Nearly all were college graduates. Six special students, all graduates from colleges, have spent the year in my laboratory in special entomological study as post-graduate students. It seems to me that such are the young men who are going to develop the entomology of our country. They are the young men who can and will do grand work in our colleges and experimental stations. These young men each take up some special family or genus of insects, to which they give the major part of their time and study. They collect in all orders and give special attention to biological work, tracing the life histories of insects, identifying as far as possible the insects they capture and try to become familiar with entomological literature, so far as they are able. The students are mutually helpful to each other. As the laboratory may be said to be a sort of perpetual Natural History, or more accurately Entomological Society, thus the students become familiar with the general laboratory work, in fact, they each become a factor in some degree of carrying the work forward. Here I will close by explaining briefly the mode of our labaratory work, which differs in some degree from the admirable plan which Prof. Forbes explained at the Washington meeting of Economic Entomologists last November. Our labels give in compact space locality, date, accession and species number. The accession number agrees with a number—serial number—in our accession catalogue for the special year. Thus, ac. 400 shows that the insect or

insects bearing that label were the 400th collected during that season. The sp. number is given as the insect is determined, and is the number of the insect in the catalogue which we use. Thus, sp. 25 is "Cicindela purpurea," as the beetle is numbered 25 in Henshaw's catalogue of Coleoptera. In case the catalogue is not numbered, as is the case with Cresson's list of Hymenoptera, then we number it. We have a column in our accession catalogue for date, collector, person who named the specimen, and also for remarks. This last column is wide, and in it we can usually write all necessary information which we received in the collecting. If we are experimenting with or studying the insect, our notes are kept on cards. These are numbered to agree with accession catalogue, and are kept in serial order until we know the species when we add the species number as well. We now index the card and place it in its correct alphabetical position in our card collections. Thus we can very easily find our notes on any specimen, either by accession number or by the name of the species. This plan works well, and, it seems to me, is very economical in respect to time. Of course our students all see this scheme and become familiar with its workings.

Dr. C. M. Weed had listened with much pleasure to the President's address and approved of most of the points brought forward. He considered a knowledge of French and German of the utmost importance from the frequent necessity of consulting works in those languages when working up the life-histories of insects. He did not, however, like the label submitted by Prof. Cook, thinking that it entailed too great an expenditure of time. He had adopted Prof. Forbes's system of labelling, and had found that it answered all purposes.

Prof. Herbert Osborn approved very highly of the course of instruction in entomology outlined in the address.

Dr. C. M. Weed then read a paper upon the life-history of the evening primrose curculio *(Tyloderma foveolatum)* which he had bred from the stems both of Œnothera and Epilobium in large numbers.

Prof. F. M. Webster had listened to the paper with much interest; as stated by Dr. Weed he had given some study to the insect in question, and was pleased to hear these further observations. He had found that when a plant was infested the beetle occurred in all its stages, and that those near the base were always further advanced towards maturity.

The meeting adjourned.

(To be continued.)

ON THE FOOD-HABITS OF NORTH AMERICAN RHYNCHOPHORA.

BY WM. BEUTENMULLER, NEW YORK.

In the present paper I have attempted to bring together all the Food-Habits of North American Rhynchophora (except the Scolytidæ) that have been placed on record in the various entomological publications, with the addition of my personal observations on the subject.

Eugnamptus collaris and *E. angustatus* I have found plentifully upon the foliage of hickory and butternut trees.

Rhynchites bicolor may be found on various species of wild roses.

Pterocolus ovatus I have beaten from live oak trees at Kissimmee, Florida, May, 1887.

Attelabus bipustulatus lives on oak, rolling up the leaves (Murtfeldt, CAN. ENT., IV., p. 143). *A. analis* and *A. nigripes* also live on oak. The latter species I have beaten from live oak at Kissimmee, Florida, in April.

Graphorhinus vadosus feeds in the imago state on the leaves of clover, according to Mr. F. M. Webster (Am. Nat., 16, p. 746).

Epicærus imbricatus, according to Dr. C. V. Riley, is injurious to apple and cherry trees and gooseberry bushes, by gnawing the twigs and fruits; also said to be found on onions, radishes, cabbage, beans, watermelons, cucumbers, beets, squashes and potato, etc.

Exomias pellucidus. I have first taken this European beetle at Astoria, L. I., in the year 1884, and again on Staten Island in 1886. In Europe it lives on the strawberry. The food plant in this country has not yet been detected. (See Ent. Am., III., p. 188.)

Ophryastes vittatus is chiefly found on "greasewood," as is also *O. sulcirostris* and *O. latirostris*, according to Mr. Wickham (Ent. Am., V., p. 77).

Panscopus erinaceus occurs on wild grape. (Schwarz, Bull. Bklyn. Ent. Soc., VII., p. 84.)

Diamimus subsericeus was taken around the roots of cottonwood by Mr. Wickham (l. c., p. 78).

Otiorhynchus sulcatus. This European species is destructive to a variety of horticultural plants. In the larval stage it attacks the strawberry, devouring the roots. *O. ovatus* also infests the roots of this plant.

Aragnomus griseus was recorded by Dr. C. V. Riley as an enemy to pear trees in Oregon. (Insect Life, Vol. I., p. 16.)

Pachnæus opalus is injurious to the orange in Florida. *P. distans* feeds on oak. (Riley, Am. Nat., 16, p. 916.)

Tanymecus confertus appears to be polyphagus, without preference for any particular plant. (Riley, l. c.)

Anametis grisea in the larval stage lives under the bark of apple and pear. (Riley, l. c.)

Pandeletejus hilaris lives in the trunk of the white oak. (Harris, Inj. Ins., p. 70), also found on beech trees by Mr. F. M. Chittenden.

Brachystylus acutus is only found on the persimmon. (Riley, l. c.)

Neoptochus adsperus feeds on oak. (Riley, l. c.)

Artipus floridanus is injurious to the orange. (Riley, l. c.)

Aramigus tesselatus, according to Mr. E. A. Popenoe, infests the sweet potato. (Industrialist, May 29th, 1886.)

Aramigus Fulleri feeds on the roots of roses. (Riley, Rep. Dept. Agricul., 1878.)

Aphrastus tæniatus lives on the paw-paw. (Riley, l. c.)

Scythropus elegans is found on the pine, according to Mr. W. H. Harrington. (Trans. Ottawa Field Nat. Club, Vol. I., No. 2, p. 33, 1881.) Mr. F. H. Chittenden also found the insect in abundance on pine (*P. strobus*) at Ithaca, N. Y.

Eudiagogus pulcher and *E. Rosenschœldi* both feed on *Cassia occidentalis* and *C. obtusifolia*. The former species I have found in large numbers at Enterprise, Fla., in May.

Sitones lineellus and *S. flavescens* are injurious to the clover and lucerne in Europe. *S. hispidulus* also lives on the roots of clover.

Plinthodes tæniatus I have beaten from small alder bushes in the Orange Mts., New Jersey. Whether the species lives on this plant I am unable to say.

Ithycerus noveboracensis is found on white and burr oaks. The larva bores in the tender twigs. I have also found the insect on hickory. Mr. W. H. Harrington found it on beech trees. (Rep. Ent. Soc., Ont., p. 52, 1880.)

Apion herculanum occurs on the flowers of *Viburnum acerifolia*, according to Dr. Hamilton. (CAN. ENT., 20, p. 67).

Apion rostrum infests the seed pods of wild indigo (*Baptisia tinctoria*).

Apion nigrum sometimes depredates the leaves of locust (*Robinia pseudacacia*). *A. fraternum* was observed upon two species of *Lespedeza* by Mr. F. H. Chittenden. *A. segnipes* was obtained from the seeds of a species of *Astragalus* by Say. (Le Conte, Ed., p. 265.)

Podapion gallicola makes a spherical or ovoid gall on pine (*Pinus inops*), Riley. (Bull. Bklyn. Ent. Soc., VI., p. 61.) I have also found the galls in the vicinity of Washington, D. C., last June.

Phytonomus punctatus lives on the leaves of clover. I have found it in abundance on timothy grass this season. *P. nigrirostris* also feeds on clover and *Buphthalmum Salicifolium*. *P. comptus* lives on *Polygonum*, and *P. eximius* on *Rumex*. (Riley, Rep. Dept. Agricul., 1881–82, p. 171.)

Listronotus latiusculus was found by Mr. C. M. Weed in all stages in the stalks of *Sagittaria variabilis*. Mr. F. M. Chittenden found *L. tuberosus*, *L. caudatus* and *L. appendiculatus* while sweeping a small patch of aquatic plants composed entirely of *Sagittaria* and a species of *Carex*. *L. appendiculatus*, it is said, was found by Mr. William Julich breeding in the lower parts of the stems of some species of reed. I have also taken two species of *Listronotus* on the flower heads of *Sagittaria* at Shingle Creek, Kissimmee, Florida, April.

Pissodes strobi is sometimes very destructive to the white pine. The larva and imago were first figured by Peck, in 1817. (Mass. Agricul. Reposit., IV., pp. 205, 211, pl. 1.) *P. affinis* is also found on the pine.

Pachylobius picivorus is placed by Mr. W. H. Harrington in a list of insects found on pine (Trans. Ottawa Field Nat. Club, I., p. 33).

Hylobius pales lives in pine trees beneath the bark, burrowing into and destroying the inner surface of the bark, and the tender newly formed wood, often doing great damage to pine forests.

Lixus rubellus has been observed in considerable numbers clinging to the leaves and blossoms of *Polygonum amphibium*. (Webster, l. c.)

Lixus parcus is said by Dr. Riley to form galls in the stems of *Amelanchier*. (Proc. Ent. Soc., Wash., I., p. 33.)

Lixus concavus. Glover has observed this insect burrowing in the foot stalks of rhubarb or pie plant. (Rep. Com. Agri., p. 90, 1865.) I have also found it on a species of *Rumex*, and also producing a gall in the stalk of the thistle, from which I raised the species. Mr. Webster also bred it from wild sunflowers. (Ent. Am., V., p. 11.)

Lixus macer. Dr. Riley reared this species from *Chenopodium*

hybridum. Coquillett observed it ovipositing in wild sunflower, as also did Mr. Webster. (Ent. Am., V., p. 11.)

Barytychins discoideus breeds in the flower heads of *Helenium tenuifolium.* (Schwarz, l. c.)

B. amœnus was found on ragweed by Dr. Hamilton. (CAN. ENT., 18, p. 114.)

Smicronyx griseus and *S. tychoides* occur on ragweed *(Ambrosia)*, according to Dr. Hamilton (l. c.)

Anchodemus angustus has been found by Mr. Harrington eating the leaves of a species of *Sagittaria.* (CAN. ENT., 16, p. 118.)

Strophosomus coryli has been found by Mr. Bailey on sweet birch *(Betula lenta)*, Jülich (Ent. Am., V., p. 56). In Europe, the species lives on oak, beech, pine and hazel.

Lissorhoptrus simplex lives on the roots of rice. (Riley, Rep. Dept. Agricul., p. 130, 1881–82.)

Magdalis barbita has been found ovipositing in fallen hickory *(Carya amara)*, by Mr. Harrington. (Ent. Am., I., p. 18.)

Magdalis olyra burrows under the bark of oak. *M. armicollis* inhabits the elm.

Magdalis alutacea probably bores in the terminal twigs of *Pinus inops.* (Riley, Bull. Bklyn. Ent. Soc., VI., p. 62.)

Coccotorus scutellaris attacks the fruit of the plum.

Anthonomus quadrigibbus punctures the fruit of the apple and pear. The larva lives in the heart of the fruit, and feeds around the core.

Anthonomus suturalis attacks the cranberry, laying its eggs in the bud, and the larva living inside the fruit.

Anthonomus sycophanta was bred from the galls of a sawfly on willow.

Anthonomus musculus is very destructive to the strawberry.

Anthonomus pusillus lives in the seed pods of the frost weed *(Helianthemum canadense).* Blanchard (Ent. Am., III., p. 87).

Anthonomus gularis oviposits in the flowers of *Cassia marylandica.* (Schwarz, l. c.) *Anthonomus flavicornis* was found by Mr. Schwarz, inquilinous in a globular acarid gall on the leaves of *Solanum eleagnifolia.*

Otidocephalus chevrolatii occurs on elm and hickory, according to Mr. W. H. Harrington. (CAN. ENT., 16, p. 118.) *O. laevicollis* was hatched by Dr C. V. Riley from the galls of a species of Cynips on oak.

Elleschus ephippiatus. I have taken this species in abundance on willow *(Salix fragilis).*

(To be continued.)

PRELIMINARY CATALOGUE OF THE ARCTIIDÆ OF TEMPERATE NORTH AMERICA, WITH NOTES.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

(Continued from page 180, Volume xxii.)

Genus HALISIDOTA Hübner.

1816—Hübn., Verzeichniss, 170.
1855—Wlk., C. B. Mus., Lep Het., III., 732.
1862—Morris, Synopsis, 347.
1873—Stretch, Zyg. & Bomb., 87, fig. venation.

Head rather well developed; palpi exceeding front; tongue moderate, but somewhat variable in the species. Antennæ of ♂ long, lengthily bipectinated to the tip, a single branch to each side of each joint. Legs short and stout, posterior longest and weakest; spurs normal, but short; claws of tarsi simple.

Primaries with v 10 out of the subcostal before the end of the cell; 7–9 on a stalk from the same point with 6; 8 and 9 branching just before the tip; 4 and 5 from the same point at the end of the median; 3 from the median some distance before the end of the cell.

Secondaries with 8 from about the middle of subcostal and very short; 6 and 7 from the same point at end of the subcostal; 4 and 5 together from the end of the median; 3 from the median before the end of the cell.

H. caryæ served as the subject on which the above studies were made. It is not improbable that there may be some difference in details of structure in the species. Many of the described forms I have seen but casually, and of a few I have seen large series. This is, in my opinion, the most difficult genus in the *Arctiidæ*. There is a *phytophagic* variation in the larva, and the larvæ are not all of the same type. From the material in the National Museum collection it would seem, too, that larvæ widely different in type, not color merely, produce insects that are superficially almost indistinguishable. The synonymy is involved, and I give it exactly as I have found it.

H. agassizii Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *Halisidota.*
1873—Stretch*, Zyg. & Bomb., 87, 102, pl. IV., ff. 8 and 9, and pl. X., f. 7, *Halisidota.*

1873—Edw., Proc. Cal. Ac. Sci., V., 187, *Halisidota.*
var. *alni* Hy. Edw.
1875—Edw.*, Proc. Cal. Ac. Sci., VII., 129, *Halisidota.*
Habitat—California.
Food plant—Willow, Alder.

H. ambigua Strk.

1878—Strk., Proc. Dav. Ac. Sci., II., 272, pl. IX., f. 7, ♂, *Halisidota.*
bolteri Hy. Edw.
1884—Edw., Papilio, IV., 121, *Seirarctia.*
1888—Edw., Ent. Amer., III., 182, *pr. syn.*
Habitat—Colorado, New Mexico.

H. argentata Pack.

1864—Pack., Proc Ent. Soc., Phil., III., 129, *Halisidota.*
1873—Stretch*, Zyg. & Bomb., 87, pl. 6, f. 12, ♀, *Halisidota.*
1873—Edw., Proc. Cal. Ac. Sci., V., 187, 369, *Halisidota.*
Habitat—California, Vancouver.
Food plants—Pinus pondorosa and P. lambertiana.

H. californica Wlk.

1865—Wlk., C. B. Mus., Lep. Het., XXXI., 311, *Halisidota.*
1873—Stretch, Zyg. & Bomb., 102, =*agassizii.*
angulifera Wlk.
1866—Wlk., Lords Trav. in Vanc. App., 335, *Halisidota.*
1873—Stretch, Zyg. & Bomb., 102, =*agassizii.*
salicis Bdv.
1868—Bdv., Lep. Cal. (Ann. Soc. Ent., Belg., XII.), 81, *Phægoptera.*
1869—Grt. & Rob., Tr. Am. Ent. Soc., III., 175, *pr. syn.*
Habitat—British Columbia, Vancouver, California.

Mr. Grote, in his list of 1882, does not follow Stretch in his reference of this species to *agassizii*, but in a note, p. 63, suggests that *californica*, *agassizii* and *argentata* may be the same species.

H. caryæ Harr.

1841—Harris*, Rept., Ins. Mass., 258, *Lophocampa.*
1855—Fitch*, 1st Rept., Ins. N. Y., 159, *Halisidota.*
1860—Clem., Proc. Ac. Nat. Sci. Phil., XII., 533, *Halisidota.*

1862—Harris*, Inj. Insects, 361, pl. vi., ff. 1 and 2, and f. 175, *Lophocampa.*

1862—Morris in note to Harris l. c., *Halisidota.*

1862—Morris, Synopsis, 349, *Halisidota.*

1863—Saund., syn. Can. Arct., 20, *Halisidota.*

1872—Pack.. 4th Rept. Peab. Ac., 87, *Halisidota.*

1873—Stretch*, Zyg. and Bomb., 87, 140, pl. VI. f. 11, *Halisidota*

1874—Lint.*, Ent. Cont., III., 148, *Halisidota.*

porphyria H. Sch.

1855—H. Sch., Lep. Exot. sp. nov. f., 283, *Phægoptera.*

1858—H. Sch., l. c. p. 81, *Halisidota.*

1864—Pack., Proc. Ent., Soc., Phil., III., 128, *pr. syn.*

annulifascia Wlk.

1856—Wlk., C. B. Mus., Lep. Het., III., 743, *Halisidota.*

1860—Clem., Proc. Ac. N. Sci., Phil., XII., 533, *Halisidota.*

1862—Morris, synopsis, Supplt., 349, *Halisidota.*

1862—Clem., in Morris Syn., 352, *pr. syn.*

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *pr. syn.*

Habitat—Maine, New York, New Jersey, Mass., Arizona, N. Mexico, California, Canada.

Food-plants—Elm, hickory, Ash.

H. cinctipes Grt.

1865—Grt., Proc. Ent. Soc., Phil., V., 242, *Halisidota.*

1866—H. Sch., Corr. Blatt, Regensb., XX., 130, *Halisidota.*

188—Gundlach*, Cont. Ent., Cuba, 269, *Halisidota.*

1884—Hy. Edw., Papilio, IV., 76, *Halisidota.*

tessellaris‡ Wlk.

1856—Wlk., C. B. Mus., Lep. Het., III., 733, *Halisidota.*

1869—Grt. and Rob., Trans. Am. Ent. Soc., II., 72, *pr. syn.*

Habitat—Texas, Florida (?), Mexico, Cuba.

Food-plant—*Hibiscus* (Gundlach).

I have in some way mislaid my original reference to Gundlach's work, and do not find the date in the copy.

H. davisii Hy. Edw.

1873—Edw., Proc. Cal. Ac. Sci., V., 365, *Halisidota.*

Habitat—Arizona.

H. edwardsii Pack.

1864—Pack., Proc. Ent. Soc., Phil., III., 129, *Halisidota.*
1873—Stretch., Zyg. and Bomb., 88, pl. III., f. s, *Halisidota.*
1875—Edw.*, Proc. Cal. Ac. Sci., VII., 21—egg and young larva.

translucida Wlk.

1865—Walk , C. B. Mus., Lep. Het., XXXI., 310, *Halisidota.*
1868—Grt. and Rob., Trans. Am. Ent. Sci., II., 85, *pr. syn.*

quercus Bdv.

1868—Bdv., Lep., Cal. (Ann. Soc. Ent., Belg., XII.), 81, *Phægoptera,*
1869—Grt. and Rob., Trans. Am. Ent. Soc., III., 175, *pr. syn.*

Habitat—California.

H. ingens Hy. Edw.

1881—Edw., Papilio, I., 39, *Halisidota.*
Habitat—Arizona.

H. labecula Grt.

1881—Grt., Papilio, I., 174, *Halisidota.*
Habitat—New Mexico.

H. laqueata Hy. Edw.

1886—Edw., Ent. Amer., II., 166, *Halisidota.*
Habitat—Texas.

H. maculata Harr.

1841—Harris*, Rept. Ins., Mass., 259, *Lophocampa.*
1860—Clem., Proc., Ac. Nat. Sci., XII., 534, *Halisidota.*
1862—Morris, Synopsis, 349, *Halisidota.*
1862—Harris*, Injurious Insects, 363, *Lophocampa.*
1871—Saund.*, CAN. ENT., III., 186, *Halisidota.*
1873—Stretch., Zyg. and Bomb., 87, *Halisidota.*

fulvoflava Wlk.

1856—Wlk., C. B. Mus., Lep. Het., III., 733, *Halisidota.*
1858—H. Sch., Lep. Exot., sp. nov., 71, *Phægoptera.*
1860—Clem., Proc. Ac. N. Sci., Phil., XII., 534, (?) *pr. syn.*
1862—Morris, Synopsis, App., 349, *Halisidota.*
1862—Clem., in Morris Syn., 352, (?) *pr. syn.*
1863—Saund., Syn. Can. Arct., 21, *Halisidota.*

1864—Pack., Proc. Ent. Soc., Phil., III., 128, *pr. syn.*

guttifera H. Sch.

1855—H. Sch., Lep. Exot., sp. nov., f. 284, *Phægoptera.*

1858—H. Sch., l. c., p. 71, *pr. syn.*

Habitat—Nova Scotia, Canada, Maine, Massachusetts, New York, New Jersey, Illinois, California.

Food Plant—Oak.

Halisidota megaphyrrha, Wlk., XXXI., 308, which should come in here has been referred to by Messrs. Grote and Robinson as not North America.

H. minima Neum.

1883—Neum., Papilio, III., 138, *Halisidota.*

Habitat—Arizona.

H. mixta Neum.

1882—Neum., Papilio, II., 133, *Halisidota.*

Habitat—Arizona.

(To be continued.)

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the Society was held in the rooms, Victoria Hall, London, on Wednesday, August 27th. The following officers were elected for the ensuing year :—President, Rev. C. J. S. Bethune, D.C.L., of Port Hope ; Vice-President, Mr. James Fletcher, of Ottawa ; Secretary. Mr. W. E. Saunders, of London ; Treasurer, Mr. J. M. Denton, of London. Directors—Messrs. W. H. Harrington, Ottawa ; J. D. Evans, Sudbury ; Gamble Geddes, Toronto ; A. W. Hanham, Hamilton ; J. A. Moffat, London. Curator and Librarian, Mr. J. A. Moffat, London. Editor of the CANADIAN ENTOMOLOGIST, Rev. C. J. S. Bethune, Port Hope. Editing Committee, Mr. W. E. Saunders, London ; Rev. T. W. Fyles, Quebec ; H. H. Lyman, Montreal. Delegate to the Royal Society of Canada, Rev. T. W. Fyles, Quebec. Auditors, Messrs. J. H. Bowman and H. P. Bock, London. The President's address and a full account of the proceedings will be published in the Annual Report of the Society.

THE BUTTERFLIES OF INDIA.*

Some three years or more ago, we noticed a work on the above subject by Marshall and de Nicéville, of which two volumes had been published, the last by de Nicéville alone. A third volume of over 500 compact pages has just come to hand, the most notable thing about which, at least to a dweller in temperate regions, is that it is wholly concerned with the Lycaenidæ, of which eighty-two genera and over four hundred species are described. Such wealth in these pigmies among butterflies is a striking fact. The author, however, beyond the generic collocation, has made no attempt to classify this immense assemblage, contenting himself with only distinguishing certain groups of genera by the name of one of the included genera, as the "Thecla group," etc., which groups are characterised in a general but not formal way in the body of the work. These agree tolerably well with the groups Doherty had previously characterised from the egg alone, but are about twice as numerous and are established mainly upon the structural features of the imago. This is better than Distant's artificial divisions, but there is plainly an open field here for investigation, and one which there is apparently no need for great delay in occupying, since (excepting the egg) the early stages of Lycaeninæ appear to offer less service to the systematist than in any other group of butterflies.

What will surprise one in this volume, is the very considerable addition to our knowlege of the early stages of the Lycaeninæ, for excepting the Hesperidæ, this group is in general the least know of butterflies. Yet something is recorded of no less than thirty-four genera, much of it new, and in many a good deal of interesting history is related. This is a great improvement on the preceding volumes. One particular case, that of the pomegranate butterfly, whose history was briefly and partially given by Westwood, seems valuable enough to reprint for the benefit of American readers; and another, Curetis thetis, may well be mentioned here:—"The twelfth segment [of the larva] bears two most extraordinary structures, which consist of two diverging, cylindrical, rigid pillars, arising from the subdorsal region and of a pale green colour. When the insect is touched or alarmed, from each pillar is everted a deep maroon tentacle as long as the rigid pillar, bearing at its end long

*The Butterflies of India, Burmah and Ceylon. By Lionel de Nicéville, Calcutta. Vol. 3. 12+503 pp. 6 pl. 1890. 8°.

parti-coloured hairs, the basal third of each hair being black, the upper two-thirds white. The maroon tentacle with its long hairs spread out like a circular fan or rosette is whirled round with great rapidity in a plane parallel to the body, its use being almost certainly to frighten away its enemies, as this larva, as far as I am aware, is not attended by protecting ants and lacks the honey-gland on the eleventh segment present in so many lycænid larvæ which are affected by ants."

Ants have been found attendant upon half a dozen genera, and in many cases they have been identified by Dr. A. Forel, of Switzerland. At least a dozen species are concerned, and they are about equally divided between the Formicidæ and Myrmicidæ.

Spalgis, it appears, is another instance of a carnivorous lycænid comparable to our Feniseca, the larva associating with and feeding upon the "mealy bug" of the planters, a species of Dactylopius. De Nicéville in no way favors Edwards's belief that Feniseca belongs to the Lemoniinæ, and adds nothing, as we had hoped he might be able to do, to Holland's suggestion that Liphyra, too, might be carnivorous, though he points out that the two genera differ in their perfect state in the number of subcostal nervules, and are therefore not so closely allied as Dr. Holland thought.

The seasonal dimorphism of many Indian Lycænidæ is well brought out, the dry and wet season taking the place of our spring and summer; indeed, it occurs in no less than eighteen genera, and this will be a revelation to many, and seems to bid fair to renovate the study of tropical butterflies. But while in India proper, "the seasonal forms seem to be chiefly restricted to two, a wet and a dry," in the Himalayan district of Sikkim "the dry season form which occurs at the end of the year differs somewhat from the dry season form which occurs in the spring, so that with regard to some species there may be said to be three forms—a spring, a wet season, and a winter form." Sexual dimorphism on the contrary is very rare among tropical Lycænidæ, de Nicéville stating that he does not know positively of any case, though he suspects it in a species of Zephyrus. On the authority of Doherty (a native of Cincinnati by the way, working most industriously in the east,) he credits half a dozen or more species as mimicking others of the same or neighboring groups of Lycænidæ. Much attention is also paid to the secondary sexual characteristics so far as their gross appearances are concerned, and they are noted in no less than nineteen genera.

Finally, we may call attention to the very interesting general chapter on the Lycænidæ at the beginning of the volume, which is of more than usual interest and rather exceptional in a work of this kind. The work itself must serve a very useful purpose ; its execution is remarkably even and shows great skill and balance on the part of the author. There are half a dozen plates like those of the former volumes and executed by the same parties, excepting that two of them are chromo-lithographs, but we could wish that some plates of the early stages might have been added, and the direct purposes of the book for the Indian student would have been served by others giving structural details.

SAMUEL H. SCUDDER.

PARTIAL PREPARATORY STAGES OF ERYCIDES BATABANO, LEF.

BY HARRISON G. DYAR, RHINEBECK, N. Y.

EGG.—Nearly spherical, the base flattened a little. Around the sides are eighteen vertical ribs, every other one shorter, not reaching the summit. The natural color could not be ascertained.

* * * * * * *

THIRD (?) LARVAL STAGE.—Head much larger than joint 2, flat before, broadly excavate at the summit, minutely granulated. Colot wine red, blackish on the lower third, with a large round orange spor before the eyes on each side. Width of head 2.5 mm. The body tapers to each extremity. Its color is wine red, with a darker shade over the dorsum centrally, and seven transverse orange stripes on the upper half of the body on joints 5 to 11, anteriorly, the posterior ones interrupted dorsally. Venter a little whitish. Length of larva about 10 mm. It forms a place of concealment in the manner of *Endamus tityrus* or *E. proteus* by folding over a portion of the leaf and securing it by threads.

FOURTH LARVAL STAGE.—Head much as before but the black shade is less and the granulations more distinct. Width 3.8 mm. Body marked as before ; very minutely pilose and with small semi-obsolete circular

spots. Spiracles small and whitish. The cervical shield covers the upper half of joint 2, is smooth and wine red. Length of larva 20 mm. When disturbed, it ejects from its mouth a large quantity of dark red fluid.

FIFTH LARVAL STAGE.—Mature larva. Head pale brown, blackish around the mouth with a large round orange spot before the eyes. It is granulated and pilose, the hairs small, and appearing frosted on the upper part of the head. Width 6 mm. The body is much contracted, and much smaller at the extremities. Cervical shield pale brown, smooth, hidden when the insect is at rest. Joint 2 is pinkish below. The body is bright frosted white, thickly covered by little circular depressions, in the centre of each of which is a minute frosted hair. These hairs are longer on the anal plate, and the depression there less deep. Thoracic feet pale brown. Venter and abdominal feet white, without the marks of the dorsum. Length of larva 40 mm., greatest width of body 12 mm., greatest height 10 mm., width of joint 2 4.5 mm. Its place of concealment, at this stage, is formed of several leaves spun together and lined with silk. Immediately after the moult, the body is colored as in the previous stage, but the white color appears gradually in the course of several days.

The leaves the larva has spun together serve as its cocoon, and the pupa is held by several transverse threads around the body, with the cremaster fastened in others.

PUPA.—Robust; abdomen large, eyes prominent. Two short prominences on the head between the eyes. The leg and antennæ cases form a point extending below the wing cases. Cremaster excavate below, with ridges at the sides above, curved downward, blunt, and terminating in a number of brown hooks. The pupa has many small, rounded depressions, and is minutely pilose. Color creamy white, a greenish tint on the thorax and cases, and a yellow stripe on the upper part of the eye. Length 32 mm., diameter of the abdomen 10 mm., diameter of thorax 9 mm., width through the eyes 6 mm.

FOOD PLANT.—Mangrove, *Rhizophora mangle;* larvæ from Dade Co., Florida. I am not sure that the larval stage here first described is the *third*, but consider it most probable.

Mailed October 6th.